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Forestry: A Community Tradition



Forestry: A Community Tradition
Third Edition

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Opening Statement

Through the efforts of the USDA Forest Service and the National Association of State Foresters the Urban and Community Forestry Program has evolved from managing street trees to understanding the role of trees in our urban ecosystems. As national leaders, we have recognized that the management of our urban forests is essential for environmental quality and the social well-being of people. As we prepare to enter the 21st Century, the problems of our urban environments demand solutions. These solutions can be found in an ecological approach to managing our urban forests. The interrelationship of people, trees, forests, green spaces, and other associated natural resources are the lifeblood of these systems.

The management of these valuable forest resources can not be accomplished by federal and state forestry personnel working alone. Our foresters need to involve local community leaders, volunteer groups and community members and jointly develop management programs. In turn, forestry professionals must involve soil scientists, arborists, horticulturists, landscape architects, planners, sociologists and many others to provide the expertise necessary to manage these unique forest resources.

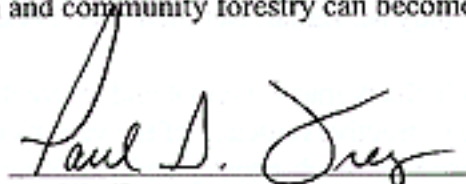
The Urban and Community Forestry Program provides communities with an opportunity to protect and maintain their valuable forest resources. Benefits associated with this natural resource include: energy savings, carbon storage, enhanced real-estate values, reduced heat island effects, recreational opportunities, wildlife habitat, visual barriers and many other environmental, aesthetic, sociological and economic improvements. The management of these valuable forests will enable current community leaders to pass on to future generations the many benefits that come from a sustainable urban and community forest.

The advancements that have occurred in the field of urban and community forestry could not have been accomplished were it not for the work done by foresters, resource managers and community leaders beginning in the late 1960's and continuing to today. The efforts and foresight of these practitioners have enabled communities to enjoy the many benefits derived from healthy and viable urban and community forests.

No one organization can meet the needs of all of our communities. Cooperation between all levels of government is the key to a successful program. This report reviews the history of urban and community forestry and spells out what it will take for all Americans to enjoy sustainable tree resources in their community. With your help urban and community forestry can become a tradition in every community.



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Peer Review Panels

National Association of State Foresters Urban Forestry Committee

USDA Forest Service Urban and Community Forestry National Program Team

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Urban Forestry Program**

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Forestry: A Community Tradition

EXECUTIVE SUMMARY

There are more than 69 million acres of urban forests associated with the nation's 45,000 communities, and in which reside nearly 80 percent of the nation's population. These forests provide tremendous ecological, economic and social benefits vital to everyone. Currently, more than 8,200 communities participate in urban forestry programs and nearly 400,000 volunteers have been involved in various aspects of the United States Forest Service, State and Private Forestry Urban and Community Forestry Program. The urban and community forestry movement has matured over the last 15 years from managing street trees to understanding the benefits of trees in urban ecosystems. This report highlights the accomplishments of the urban and community forestry movement; examines the trends in urban and community forestry; evaluates the economic, ecological, environmental, and social values of forests and trees to communities; and makes recommendations for federal, state and local governments, and the private sector, to enhance urban and community forests. The recommendations are:

1. Foster strong partnerships between federal, state, local and private sectors in implementing the National Strategic Plan for urban and community forestry.
2. Establish national, regional, and local initiatives and incentives that assist communities in the implementation of an ecosystem-based management of urban and community forest resources. Use modern technology (i.e., Geographic Information System and Global Position System) to enhance our vision of future urban and community forests.
3. Develop long-term cost-effective management plans for urban and community forests at state and local levels to maximize ecological, economic, and social benefits of urban and community forest resources.
4. Increase the budget for management, education, and research in urban and community forestry at federal, state and local levels.
5. Develop and promote national, regional and local education programs in urban and community forestry to increase public awareness and participation.
6. Encourage and support institutions of higher education and professional organizations to offer urban forestry degrees and related programs and to provide and train urban forestry professionals to meet the national demand for managing urban forest resources.
7. Continue to support and expand urban forestry research and demonstration projects. Increase funding for urban and community forestry research and technology transfer as prioritized in the National Research Agenda for 1990s.

8. Support and promote citizen-based volunteer organizations nationwide and recognize their roles in successful implementation and management of urban and community forestry programs for vital and healthy urban ecosystems.
9. Develop strategies to encourage all communities to recycle, reduce, and reuse urban waste wood.
10. Develop disaster preparedness and mitigation strategies at the community level to reduce the cost associated with natural disasters.

Forestry is a community tradition. To keep it a tradition, the recommendations made in this report need to be implemented. Such action could stimulate all communities to develop and enhance forest management programs and help to achieve vital communities through healthy ecosystems.



Purpose

The United States has more than 69 million acres of urban forests that are associated with the nation's 45,000 communities, and in which reside nearly 80 percent of the nation's population. Urban and community forests are comprised of street trees, open space, patches of forested areas, trees in institutional properties, municipal parks, playgrounds, yards, and trees along highways. These forests are vital to millions of Americans. Urban and community forestry programs have matured over the last 15 years from managing street trees to understanding the benefits of trees in urban ecosystems.

This assessment:

- Highlights the accomplishments of the urban and community forestry movement
- Examines the trends in urban and community forestry
- Evaluates the economic, ecological, environmental, and social values of forests and trees to communities
- Makes recommendations for federal, state, and local governments, and the private sector to enhance urban and community forests



History

Urban and community forestry is an integral part of U.S. history. The tradition began when the first public shade tree planting was completed along the roadway between Boston and Roxbury in 1646. In the 18th century, William Penn, proprietor of Pennsylvania, required that when clearing land, one acre in every five be left in trees. In 1791, Pierre L'Enfant designed roads in Washington, D.C., in a radial pattern and lined them with trees. By the 1850s, Frederick Law Olmstead's design for Central Park emphasized the importance of open space (Johnston 1975). The late 1800s marked the passage of various state legislation allowing municipalities to spend public funds for arboriculture, the planting and maintenance of city shade trees (Massachusetts 1899). The importance of tree planting and care was formally recognized with the creation of Arbor Day in 1872.

A true national program did not develop until the 1960s. In 1962, the President's Outdoor Recreation Resources Review Commission (ORRRC) included urban forestry information. In 1965, the White House Conference on National Beauty was established as Ladybird Johnson actively pursued a nationwide beautification campaign. In this climate, then Deputy Chief of the Forest Service, Philip Thornton, advocated an active urban forestry program, and in 1967, a USDA Forest Service interdepartmental task force presented a landmark report: A Proposed Program for Urban and Community Forestry.

The Cooperative Forest Management Act, as amended in 1972, authorized the urban and community forestry program, but funding was not provided. The Cooperative Forestry Assistant Act of 1978 expanded the federal government commitment to urban forestry by authorizing the Secretary of Agriculture to provide financial, and related assistance to State Foresters to encourage states to provide information and technical assistance to local governments. An allocation of \$3.5 million was made to provide urban and community forestry assistance in 1978. However, the commitment to urban forestry on the part of the federal government did not change for more than a decade, and in fact declined to 1.5 million in 1984 (Casey and Miller 1988). The national commitment to urban forestry by the federal government was part of the 1990 Farm Bill which fundamentally changed this nation's approach to managing urban and community forests.

In 1990, Congress adopted a 10-year tree planting initiative proposed by President George Bush. The President's America the Beautiful program became a national tree program. The America the Beautiful Act of 1990 was aimed at planting and improving trees in every rural area, town, and city across the country (USDA Forest Service 1991). Section 1219, Urban and Community Forestry Assistance, amended the basic law, 16 U.S.C. 2105, the Cooperative Forestry Assistance Act, to:

- Expand the authority of the Forest Service to work with states to administer grants and technical assistance.
- Raise funding from \$2.7 million in 1990 to \$25 million in 1993.
- Create a 15-member National Urban and Community Forestry Advisory Council (NUCFAC) appointed by the Secretary of Agriculture.
- Establish the National Tree Trust Foundation.

The National Tree Trust (NTT), a non-profit tree planting foundation, was established. Designated by President Bush to receive the support of the U.S. Congress, the NTT is designed to mobilize volunteers, promote civic involvement, and bring corporate and civic institutions together in support of local tree planting and preservation.

To fulfill the mandate of the 1990 Farm Bill calling for a national urban forestry research plan, the USDA Forest Service undertook an assessment of research needs and objectives in urban forestry. The Forest Service enlisted the assistance of the International Society of Arboriculture (ISA) to help achieve its legislative mandate for a national research agenda. In October 1991, a National Research Agenda for Urban Forestry in the 1990s was published, which included research needs for the 1990s, the research agenda for urban forestry, and the recommended priorities for new and expanded research efforts in urban forestry (ISA 1991).

The US Congress raised the appropriation for urban and community forestry to \$21 million in 1991. These funds helped to create an urban forestry coordinator position in all 50 states plus the District of Columbia, Puerto Rico, the Virgin Islands, and the islands of the Pacific; to set up state urban forestry councils in all 50 states, the District of Columbia, Guam and Puerto Rico; and to establish the capacity to promote volunteer activities related to planting, maintaining or protecting the urban forest resource (Schoeneman and Doyle 1992).

The National Strategic Plan for urban and community forestry was completed by the NUCFAC in 1993. An accompanying Action Plan which breaks the Strategic Plan into implementation steps was completed in March 1994. To strengthen cooperation and coordination among the NUCFAC, State Foresters, nonprofits, municipal and other professional organizations, the USDA Forest Service developed a strategic direction to address urban and community forestry issues and opportunities. This strategic direction entitled "Urban and Community Forestry on Course into the Future: Vital Community through Healthy Ecosystem" provides guidance for Forest Service Urban and Community Forestry efforts through the year 2005 (USDA Forest Service 1996).

The importance of urban and community forestry was well recognized by the 7th American Forest Congress in 1996 and the issues were strongly addressed in the Congress's vision elements and principles. (See page 34.)

Highlights of National Accomplishments

As a result of urban forestry programs throughout the nation, communities have been improved and are becoming more livable. Tree planting, care and maintenance activities involve local citizens that they can make a difference in their communities. Urban forestry has served as a catalyst to engage local citizens in the management of their local resources. This empowerment has enabled citizen groups to expand their involvement to many other issues that effect their communities. More than 8,200 communities participate in urban forestry programs and nearly 400,000 volunteers have been involved in urban and community forestry programs nationwide (USDA-FS 1998). The USDA Forest Service working cooperatively with State Foresters provides national leadership in the management of natural resources in the urban and community environment. With the assistance of federal funding and national guidance, State Forestry agencies, non-profit citizen volunteer groups, conservation and professional organizations, engage more than 7,000 community-based, volunteer organizations in making positive changes in their communities through improvement of the nation's urban and community forests. The detailed national accomplishments were documented by the NUCFAC reports and reports of USDA Forest Service (Schoeneman 1996 and USDA-FS 1998).



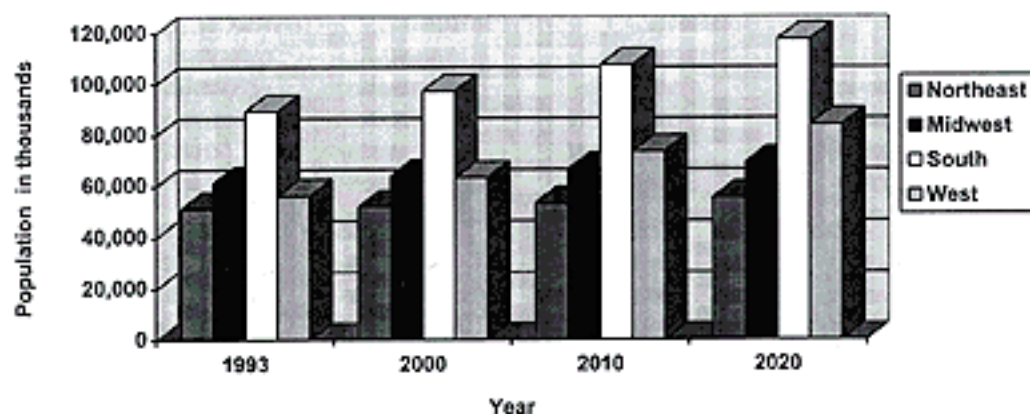
Issues and Trends

Population and Demographics

Urban and community forests are found in the more than 45,000 communities where people live and work. This includes both incorporated cities, as well as unincorporated suburbs, villages, and in some cases subdivisions. With 252 million people, the U.S. growth rate is about 1% per year (Murdock 1995). Nearly 80% of the U.S. population live in urban areas.

The population of the United States is migrating internally from the Northeast and Midwest to the South and West. Minority populations are growing more rapidly than Anglo populations. More than 30% of the total population change over the last decade was due to immigration. Additionally, the population is aging and projected to have higher proportions of females (Murdock 1995).

Each year, thousands of acres of rural land is converted to urban uses. Development is encroaching on many of our remaining open spaces. Development pressure in the wildland and urban fringes causes loss in forest cover and biodiversity and associated problems with air and water quality, wildlife habitat, and so on. Additionally, inner city environmental conditions are declining as residents move out and investments decline. Economic stress and social stability, as well as environmental pressures are causing significant decline in urban forest health. Moll and Young (1992) report that more street trees die than are planted each year and the average life span of a downtown tree is only thirteen years. Budget cuts and significant backlogs of maintenance work help create unhealthy forest conditions.



Population projections in thousands by region in the US.
(Source: Census Bureau)

Issue Statement

Urban and community forests provide many benefits such as energy savings, carbon storage, enhanced real estate values, reduced heat island effects, recreational opportunities, wildlife habitat, visual barriers, and many other environmental, aesthetic, sociological and economic benefits. These forests affect the lives of millions of people living in these communities and are where a majority of our citizens live, work and play. Maintaining urban forest health and sustainability is a long-term, difficult task.

Dutch elm disease, gypsy moth, blight, drought, fire, storms, pollution, loss of biodiversity and construction damage are just a few of the stresses placed on our aging community forests. This stress may be observed in small towns as well as large metropolitan cities. Urban and community forest health decline has been a gradual result of a variety of resource, financial, jurisdictional, ecological, and management problems that are now reaching crisis proportions.

In many larger cities, people may feel further removed from understanding the values that urban trees provide. Trees are a low priority in city budgets because their benefits have not been measured, understood, and communicated by leaders. Given the virtues of an urban forest, one might think that such ecosystems are carefully protected. But in the last several years, shrinking municipal budgets have produced a crisis for our nation's urban forests. Downsizing of local governments has led to drastic cuts in spending for urban forest management and shifts in management control of the urban program. These cuts reduced the ability of urban foresters to care for urban trees, particularly to maintain adequate inspection and pruning schedules, and to guard against pests and diseases. Also, cuts in budget first and foremost, slash the tree planting programs.



Trends



The National Strategic Plan (NUCFAC 1993) calls for establishment of sustainable urban and community forests and improved ecosystems. The challenge facing urban and community forestry's future is to encourage all sizes of towns and cities to properly plant, maintain and preserve trees in greatly increasing numbers to help provide cooler summer air, warmer homes in winter, cleaner air and water, quieter streets, more peaceful neighborhoods, more community jobs, stronger urban economies, and an overall improved and expanded community environment. To be successful, the National Strategic Plan has developed six strategies,

including public outreach, municipal and volunteer programs, career training, funding, research, and private and public partnerships along with the Action Plan (NUCFAC 1994). The health of the nation's urban and community forests depends on successful execution of the plan.

The USDA Forest Service's Urban and Community Forestry Program Strategic Direction developed in 1996 will serve as a major driving force to ensure the successful implementation of the National Strategic Plan. **"Vital communities through healthy ecosystems"** is the thrust of the program emphasis for the Forest Service strategy to address urban and community forestry management issues.

The National Association of State Foresters' (NASF) Position Statement developed in 1994 calls for **"an ecological approach to urban and community forestry management."** The interrelationship of people, trees, forests, green spaces and other associated natural resources of our urban areas are the lifeblood of urban systems. Federal, state and local governments working in partnership with community leaders, local businesses and volunteer groups must rise to the challenge of integrating urban and community forest resources management into community planning, park management, development and fiscal structure through an interdisciplinary team approach. Communities must develop a stewardship ethic that focuses on conserving, developing and maintaining functional, sustainable urban and community forest ecosystem. The adoption of an ecological approach in managing our urban forests will result in sustainable environments, but, more importantly, it will improve the living conditions for the citizens of our nation's communities (NASF 1994).

A vision of the future urban and community forestry should be:

- Establish sustainable urban forests for all communities. These forests will provide jobs, healthier economies, stronger communities, and improved ecosystems.
- Integrate the natural ecosystem into the built infrastructure. Account for ecosystem benefits in the planning, design, engineering, maintenance, and funding process to achieve sustainable urban communities.
- Expand research and new technology that help us to quantify the values of the urban forest and to articulate these values to improve public policy and dedicated funding.
- Continue to strategically plan biological diversity in the urban ecosystem.
- Advocate healthy, sustainable urban ecosystems through citizen stewardship, and public education to strengthen the human connection to nature and their investment in the urban forest.
- Increase organized tree plantings and foster more public-private partnerships to provide opportunities for public involvement.

Sources: American Forests (1996a) and the National Strategic Plan (NUCFAC 1993)

Needs and Action

Quality Management of Physical Resources



The physical resources include atmosphere (air), hydrosphere (water), and lithosphere (soil). Urban and community forests as an important part of the biosphere interact with and depend on these physical resources. American Forests reported that an estimated ecological value of the U.S. urban forests is about \$40 billion dollars. Quality management of these physical resources is the key to ensure a healthy urban and community forest ecosystem.

AIR QUALITY

Polluted air threatens public health, property, animal, and plant life. Trees can remove air pollution by intercepting particulates and absorbing gaseous pollutants. For example, Forest Service research (Nowak 1994a) shows that the urban forests in Chicago in 1991 removed an estimated 15 metric tons of carbon monoxide (CO), 84 tons of sulfur dioxide (SO₂), 89 tons of nitrogen dioxide (NO₂), 191 tons of ozone (O₃), and 212 tons of particulate matter less than 10 microns in size. The estimated value of pollution removal was \$9.2 million. Large, healthy trees remove about 60 to 70 times more pollution than small trees. Planting of 500,000 trees in Tucson was projected to reduce particulates by 8,000 tons per year at an average annual avoided cost savings of 1.4 million dollars. Cleaner air will also result in reduced health care costs. For many cities with severe air pollution problems, tree species with high tolerances for air pollutants, longer periods of leaf retention (e.g., conifers), and rough or hairy leaf surfaces (oak, birch, sumac etc.) should be selected, with consideration given to relative hydrocarbon emission rates of various species (ISA 1993).



CARBON STORAGE

Increasing levels of atmospheric carbon dioxide (CO₂) and other "greenhouse" gases are thought by many to be leading to increased atmospheric temperatures through the trapping of certain wavelengths of radiation in the atmosphere. Trees in urban areas offer the double benefit of direct carbon storage and the avoidance of CO₂ production by fossil-fuel power plants through energy conservation from properly located trees. Trees throughout the Chicago area store approximately 5.6 million tons of carbon (Nowak 1994b). Rowntree and Nowak (1991) have estimated that approximately 800 million tons of carbon are currently stored in U.S. urban forests, with an annual increase of 6.5 million tons. Using control costs of \$28 per ton of carbon (California Energy Commission 1993), it could be implied from this estimate that the carbon-storing capacity of U.S. urban forests exceeds \$22 billion. Thus, planting and maintaining urban forests are a cost-effective tool for cities to offset the increasing CO₂ level in the atmosphere. Because growth and mortality rates affect removal of atmospheric carbon by trees, sequestration

and storage of carbon could be maximized by selecting fast-growing, long-lived species and ensuring their health and survival (ISA 1993).

ENERGY CONSERVATION



Trees are economical energy conservation measures because they meet the need for energy services to heat and cool buildings at a lower cost than is needed to generate new energy supplies. Projections from computer simulations indicate that 100 million mature trees in U.S. cities (three trees for every other single family home) could reduce annual energy use by 30 billion kilowatts per hour, saving \$2 billion in energy costs (McPherson and Rowntree 1991). Temperatures in cities are typically higher than surrounding rural areas because of reduced air flow, the extent of high density artificial surfaces that store heat, and heat production from automobiles and buildings. This 'urban heat island' translates into greater amounts of cooling energy expended to maintain human comfort as areas become developed. Trees modify climate by 1) reducing solar gain from shading of structures and surfaces, 2) lowering dry bulb temperatures through evapotranspiration (ET), and 3) modifying wind speed and direction (Huang et al. 1987).

People have the largest impact on the land and can make the most cost-effective improvements. American Forests reported that, in a Frederick, Maryland new development, when trees were placed around new homes for purely aesthetic reasons, their energy conservation value was only \$3,800. When trees were strategically planted around the same homes for energy conservation, the value increased to \$16,200. In Tucson and Miami, reductions in annual cooling energy use from dense tree shade were directly estimated to save \$249 and \$235 per home, respectively, with west wall shade providing the greatest savings (McPherson et al. 1988). In Chicago, increasing tree cover by 10% (or about three trees located in optimal energy-conserving locations per building) could reduce total heating and cooling energy use by 5% to 10% (\$50 to \$90) (McPherson 1994a). Planting "solar friendly" trees to the south and east can minimize the energy penalty associated with blocking irradiance during the heating season. Using energy-efficient landscapes are strongly recommended.

Windbreaks can reduce heating energy needs by lowering air exchange rates, i.e., by minimizing the passage of air into and out of buildings (Dewalle and Heisler 1988). Consequently, plantings for wind control may provide substantial heating energy savings in windy and cold winter climates. In Pennsylvania, coniferous windbreak plantings reduced wind speeds by 50% and saved 6.6% of heating energy for mobile homes (Walk et al. 1985). Evapotranspiration (ET) is the water taken in by plant roots and transpired through plant cuticle and openings and evaporated from vegetative surfaces. About 60% to 70% of the solar energy received by a tree is released during the process of transpiration (Bernatzky 1978 and Qi et al.



1991). ET can lower building surface temperatures (McPherson et al.1988) and reduce cooling loads up to 17% (McPherson et al. 1993).

Research has suggested that regional differences in climate will in large part dictate management decisions aimed to conserve energy use. In all climates, however, siting trees opposite west walls and shading air conditioners can lower cooling energy use. In warm climates, cooling breezes should not be blocked. In cooler climates of the north where heating costs exceed cooling costs, tree plantings for wind control will be most beneficial, and tree shade should be minimal in the winter. Species selection to optimize tree effects should be based on crown density, size and form throughout the year (ISA 1993).

WATER



Vegetation is part of the water cycle since it intercepts, stores and uses water. As areas become developed, the relative amount of impervious surface increases, i.e., parking lots, roads and buildings, and begins to dominate soil and vegetative land cover.

Consequently, soil infiltration is reduced, thereby intensifying the volume and rate of runoff and increasing pollution loads. These effects cause flooding and water quality problems (Ripely and Ellertsen 1971). Increasing vegetative cover in cities can potentially mitigate many of the hydrologic impacts of urban development.

Henson and Rowntree (1985) found that for a 12-hour storm, the existing tree canopy of Salt Lake City reduces runoff by 17% or 11.3 million gallons. Trees intercept rainfall and reduce runoff, thereby functioning like retention/detention basins essential to many communities. Savings in storm water management costs from trees in Tucson were calculated at \$0.18 per tree per year or \$600,000 over 500,000 trees and 40 years. Reduced runoff due to rainfall interception can also reduce storm water treatment costs in many communities (Dwyer 1991). According to American Forests (1996b), 10% of tree canopy cover in Dade County in Florida reduces storm water flow by up to 15%.



SOIL



According to the U.S. Department of Agriculture, the U.S. loses 5.4 billion tons of soil annually from cropland, pasture and range. Soil scientists estimate the erosion factor on developed areas is 10 times greater than on cropland, 200 times greater than on pasture, and 2,000 times greater than on forests (Maslow 1977). Vegetation and litter protect soil aggregates, thus diminishing erosion and consequently improving storm water quality by reducing sediment. If trees are not retained or replaced during development, the damage to streams, rivers and other waterways from urban runoff can be substantial.

Forested and natural areas within or near communities can potentially function as a filter for effluent and storm water, with resulting increases in tree growth, improved water quality from tree uptake of nutrients, removal of sediments, and groundwater recharge (Corbett 1980). Referencing studies in the Washington, D.C., and Baltimore, Maryland, vicinity, Lull and Sopper (1969) noted that sediment yields of forested lands were about 50 tons per square mile per year, while developing areas could reach 25,000 to 50,000 tons of sediment per square mile per year. With 1.12 tons of soil per cubic yard (Griffin 1972), a cost for removing this quantity of sediments from streets at an average of \$8 per cubic yard (Obert 1977) would range from \$224,000 to \$448,000 per square mile per year, giving an implied value for trees preventing this amount of sediment.

Recycling

"Reduce, Reuse, Recycle" are three key words that Americans hear and use often as we continue to generate 180 to 200 million tons of municipal solid waste each year. It is estimated that yard waste (includes tree and landscape residues) accounts for roughly 18% of this municipal solid waste (Whittier et al. 1995). Currently about 60% of the waste wood and paper goes to the landfill and about 25% is recycled (USDA Forest Service 1991). The amount of waste wood and paper is estimated to be equivalent to an annual harvest of 3 million acres of southern pine plantations. "Recycling Municipal Trees" by Cesa et al. (1994) is a new guide for marketing sawlogs from street tree removals in municipalities. By increasing our efforts in recycling dry wood and waste, urban tree and landscape residues, and paper products, we can help reduce environmental pollution, conserve our forest resources, and generate economic opportunities, such as sawmilling urban waste logs (Blanche and Carino 1996). Thus, recycling is a strong justification for conserving and managing our urban forests.



The earth is viewed as a closed system with sunlight as the only source of input from outside. In nature, there is no such thing as waste. Everything else is recycled. It is when humans interrupt this natural recycling process that results in the piling up of wastes and the generation of pollutants. Thus, there is a need for urban dwellers to understand the natural cycles of our forest if we are to be effective in maintaining and sustaining them. Humans must find ways to reconnect these cycles (Kollin 1994, 1995) and bring about a sustainable city through pollution and waste reduction and increased energy use efficiency (Gangloff 1995). If our community forests are well maintained and the natural cycles are reconnected, trees live longer; hazard trees are exceptions, tree removals are less common, energy use efficiency is increased and our community forests are more sustainable.



Landscape Aesthetics and Recreation

In urban areas, contact with nature is limited. Greenery within cities may provide the only opportunity for city dwellers to experience the seasonally changing sounds, smells, and sights of natural areas and the plant and animal life they support. Current research has shown trees to be among the most important features contributing to the aesthetics of residential streets and community parks. Perceptions of aesthetics and personal safety have been measured and statistically related to manageable features such as number of trees per acre and view distance. Park and arboretum visitors have reported that trees and forests provide settings for significant emotional and spiritual experiences (Dwyer et al. 1989, Dwyer 1991).

Maintaining the quality of the recreation experience around urban areas will require substantial improvement in the size and condition of our parks. Managers will have to develop techniques for evaluating the condition of their trees and replacing them on a regular basis (Schroeder & Green 1985). However, the use of urban parks will continue to increase and will go beyond the capability of existing parks unless new areas are added.

The condition of the trees in urban parks has been declining for many years. In Baltimore's largest park, the rate of loss has been ten to one for the period 1975 to 1985. In Chicago's Reed-Keppler Park, a study by Tom Green formally with the Morton Arboretum shows 53% of the existing trees will die in the next 20 years. Increased use of parks stresses trees, making conditions for growth more difficult (Green 1984).



Property Values and Economic Impact



Forests are major capital assets to America's communities. Street trees alone number some 60 million representing an estimated \$30 billion price tag and potential for \$80 billion value if properly managed and cared for (Schoeneman and Doyle 1992). Nowak (1993) calculated that the urban forest of Oakland, California had a price tag of \$385.7 million, with residential trees accounting for 58.6% of the total. Trees destroyed in the 1991 Oakland fire were valued at \$26.5 million. Economic benefits from urban forests can be realized indirectly from increased tax revenues and income levels from new industry attracted by urban forest amenities, and directly from increased property values.

Property values can be up to 27% higher in areas with well tended trees compared with similar areas with no trees (Payne 1973). In a New York town, Morales et al. (1983) attributed \$9,500 in higher sale prices to the presence of trees. Anderson and Cordell (1988) surveyed sales of residential properties in Athens, Georgia, from 1978 to 1980. The average house sold for 3.5% to

4.5% more for having five trees in its front yard. Trees are a part of a town's infrastructure, and if properly planted and maintained they appreciate in value while other components of the infrastructure depreciate. For example, correct pruning on a four-year cycle can increase tree value 2% a year. In contrast, incorrect pruning, such as topping, can lower values by as much as 90% (Arbor Age 1987). In addition, maintaining tree health and selecting the right tree for the right place will increase property and overall tree values (ISA 1993).

There is also the broad contribution of urban forest resources to the economic vitality of a city, neighborhood or subdivision. Many areas strive to be designated as a "Tree City USA" which is certified by the National Arbor Day Foundation's Tree City USA program. To become a "Tree City USA" requires commitment of local finances, administrative and government resources to urban and community tree activities, and citizen involvement. Community action programs that start with trees and forests often spread to other aspects of the community and result in substantial economic development (Dwyer 1991).



Social Well Being



There is strong evidence that urban trees and forests can make significant contributions to the physical and mental health of urbanites as well as help speed their recovery from surgery. Hospital patients with window view of trees recover significantly faster and with fewer complications than comparable patients without access to such views. Trees help reduce the stress many people experience in urban settings and they create feelings of relaxation and well-being (Ulrich 1984, 1986, Ulrich et al.1991).

Urban forests help build stronger communities and in doing so, they contribute to lower levels of violence in the home. Urban and community forests can help satisfy important human philosophical and emotional needs. Active involvement in tree-planting programs has been shown to enhance a community's sense of social identity, self-esteem, and territoriality, and it teaches residents that they can work together to choose and control the condition of their environment (Dwyer 1991).



Wildlife



Community forests provide wildlife habitat, which is one of the least acknowledged, but widely appreciated uses. Studies indicate that urban residents want to observe wildlife in their cities. The 1985 Survey of Fishing, Hunting and Wildlife Associated Recreation, by the U.S. Fish and Wildlife Service, reports that 109.7 million people, over half the adult population, participates in wildlife-related activities, such as feeding, observing, or photographing wild animals. Of these, 96% enjoy these activities around their homes. Many urban dwellers now value wildlife in their immediate environment as evidenced by increasingly positive public attitudes toward urban wildlife.



Wildlife in cities may offer greater opportunities for environmental education and non-consumptive recreation than remote locations because of the proximity to large numbers of people (Shaw et al. 1985). It is commonly believed that only animals from outside the city use greenways to enter urban areas. However, the opposite is true; because of the high diversity of plant life and abundance of foods, much of the wildlife is native to these corridors (Tylka 1987). The highest bird density occurred in the area of largest trees, greatest tree species richness and area of weedy growth. A study in Tucson shows a strongly positive relationship between density of native bird species and volume of native vegetation (Mills et al. 1989). Community trees, as one component of urban wildlife habitat, can be managed to encourage wildlife populations. Maintenance of multi-layered canopies of a high species diversity within patches of interconnected greenspace is recommended (ISA 1993).

Effects of Natural Disaster



Natural disasters pose many threats to the health and vitality of our urban and community forests. Freeze, fire, drought, flood, tornadoes, hurricane, lightning and ice storms are the major adverse environmental factors that damage trees and forests, as well as many nonnative or exotic invasive species that can also become a nature disaster, such as Australia pine grown in Florida. Each city or community needs to prepare a disaster mitigation plan suited to their local situation. The publication entitled "The Storms Over the Urban Forest" (Burban and Andresen, 1994) has valuable information for community leaders interested in planning for and responding to natural disasters.



Municipal Tree Program Budgets and Volunteer Action



Urban forest management requires investment of economic resources for establishment, preservation, and care of community trees. McPherson et al. (1993) surveyed tree programs in cities across the U.S. for program costs. Ten program related costs were identified and included average values by diameter inch for pruning (\$5 to \$7), tree removal (\$15 to \$18) and stump removal (\$4 to \$5), and per tree per year costs for liability (\$1), pest and disease control (\$0.88 to \$2), inspection (\$0.92), program administration (\$0.92), and infrastructure repair costs for walk-curb-gutter (\$2.3) and sewer and water (\$0.75). In Chicago, projected benefit-cost ratios were largest for trees planted in residential yards and public housing sites (3.5:1), and least for parks (2.1:1) and highways (2.3:1) (McPherson, 1994b).

An extensive survey of municipal tree managers by Kielbaso (1988) showed that mean tree care budgets represent from .02% to .09% of total municipal budgets in cities with populations over 100,000 and up to 1.91 % in cities with populations below 5,000. Most municipal forestry expenditures are targeted for street and some for park plantings. Based on a national average, more than 50% of tree care budgets are allocated to trimming, removal, and disposal, 14% to planting and the remainder to supervision, pest and disease control, watering, storm, and other miscellaneous expenditures. Only 39% of the municipal programs surveyed systematically provide tree care. The other 61% are limited to responding to emergency calls. In many municipalities, some kind of contracted or volunteer service is used.

Another intensive survey on municipal tree management projects and managers conducted by Tschantz and Sacamano (1994) consisted of 1,228 communities across the United States. The study shows clearly that, while municipal administrators believe the urban forest is important, especially for beautification and increased quality of life, funding for municipal tree management is on the decline and municipal budgets for tree care activities have decreased significantly from 1987 to 1994.

It is important for communities to seek alternative funding sources to maintain the health and benefits of the urban forest. As such, public support is essential to a successful program. Citizens not only influence decision on how tax dollars are spent, but they can also contribute money, labor and other resources to urban forests through volunteer programs. Networks of citizen's groups across the nation provides support for continued community action and assistance to new volunteer organizations as they begin developing their own local initiatives. A national coalition of grass root tree groups such as Alliance For Community



Trees play an important role in planting and management of urban and community forests across the cities and towns in the U.S. Volunteer action is essential to the success of sustaining urban and community forest resources and program activities.

Managing the Ecosystem

The word "ecosystem" describes both our "house" or community and the web of life that connects everything on the planet. Ecosystem is defined as the interaction of a group of organisms (plants, animals, and microbes) and their physical environments (air, water, soil) that sustain life. Cities are ecosystems of many species of plants and animals. Ecological management of urban and community forests recognizes the interdependence of all these components and takes a holistic approach to maintain healthy ecosystems. The purpose is to integrate and maintain the natural systems into our human-made community systems to maintain biological diversity and community sustainability (NASF 1994).

Today, federal and state land-management agencies are managing ecosystems to bring a science-based approach to caring for complex landscapes. The ecosystem-based management process is guided by the principles of conservation, sustainability, diversity and connectivity, which have been defined in both ecological and social terms. Ecosystem-based management (USDA Forest Service 1993, 1994) is a planning and decision making process that has been developed to facilitate the integration of natural and social systems into the community development process. We have the ability to understand, adjust, and monitor community development to support natural and social systems through Geographical Information Systems (GIS) and other tools. But, a more holistic and inclusive process for planning and management is needed to preserve viable natural systems in association with current land use patterns (Elmendorf 1996).

Managing the ecosystem requires integration of many professional disciplines at greater levels of participation and cooperation of knowledgeable, committed and enthusiastic community leaders. These include urban foresters, soil scientists, arborists, horticulturists, entomologists, pathologists, landscape architects, ecologists, economists, regional planners, sociologists, wildlife biologists, fish biologists, community leaders, and concerned citizens and volunteers. Stewart Pequignot, Chairman of Urban Forestry Committee of NASF, writes:

The challenge to urban forest managers in the 1990s and beyond is to manage the entire forest as a viable, functional and sustainable system. This ecological approach is a fundamental step towards enhancing environmental benefits of the urban forests. This approach will produce desired resource values, products and conditions. The application of this management approach will sustain the diversity and productivity of our urban forests. For it to be successful, managers must coordinate natural processes with land-use planning and community development initiative and a community's social, historic, political and economic resources (Pequignot 1996).

National Education Program and Public Outreach



Over the last 10 years, national educational programs in urban forestry, arboriculture, and related fields have increased significantly. ISA(1995) has compiled a computerized database of curricula catalog of all the institutions of higher education (universities, community colleges, and equivalent institutions) in urban forestry and related fields worldwide. In the United States, about 50 institutions located in 26 states provide urban forestry related curricula. These institutions are crucial for producing urban forestry professionals (urban foresters, arborists, horticulturists, research scientists and managers) and providing career training opportunities in urban forestry and related fields.

Diversification of the job force has increased over the last five years. The nation's first B.S. degree program in urban forestry was established at Southern University and A&M College in 1991 with support from the USDA Forest Service. This program has graduated more than 20 African-American students with B.S. degrees in urban forestry who are entering the job force in urban forestry and related fields. In addition, federal, state, private sectors and professional organizations like ISA, American Forests and Society of American Foresters, are working together to provide continuing education opportunities and information in urban forestry to the general public and tree groups.

To enhance urban forestry education, we need to identify and promote a model curriculum for urban forestry education at the college and university levels, encourage professional groups to establish certification for professionals such as ISA certification program for arborists, develop a system to support meeting national standards such as accreditation in urban forestry, recruit to create diversity in the urban forestry profession, and support quality urban forestry curricula in vocational or technical secondary education programs. We also need to promote education for related professions like contractors, city planners, fire safety officials, and public works employees.

However, educational programs reaching out to youth, general public, private enterprise, and decision makers need to be assessed and strengthened. As identified in the National Strategic Plan (NUCFAC 1993), public outreach and career training are important strategies to enhance our urban and community forests. In order to do so, we need assessments of current levels of knowledge and information about the care, management, benefits and values of trees, forests and related resources to establish baseline data for targeted audiences with specific national educational awareness programs. Youth education should stress hands-on activities with incorporation of Project Learning Tree, Arbor Day, Global ReLeaf, Project Wild, Tree City USA, Urban Tree House, and other programs. Use of diversified media to deliver urban forestry information, especially through information super highways like the Internet (World Wide Web, E-mail, etc.) is one effective tool to reach out to all levels of audience.

Awareness and Participation

Use of national educational programs and outreach strategies to increase the general public and private sectors' awareness and participation is an important step to ensure a self-sustaining urban and community forest. The National Strategic Plan (NUCFAC 1993) called for public and private partnerships in urban forestry. Government cannot improve urban and community forestry by itself. Private citizens, corporations, and nonprofit organizations must work cooperatively with local leaders to improve the economic viability and living environment of towns and cities. Although volunteers, professionals, and local governments can provide leadership, more funding and initiative must come from the private sector. Successful programs developed by the private sector can help encourage other urban and community forestry projects by motivating citizens and corporations. Recommended actions are to develop a venture capital fund for use by urban and community forestry businesses, establish federal appropriation for the Small Business Administration to target funding for small businesses in all aspects of urban and community forestry, and expand and enhance outreach programs for large corporations, small businesses, nonprofit organizations, community groups, homeowner groups, and individuals to become involved in urban and community forestry. In addition to distribution of information about successful model programs through publications, meetings and conventions, and professional associations will increase awareness and participation of target audiences.

All communities must have high quality, self-sufficient programs to manage and improve urban and community forests. Each local area has situations that require unique solutions, so a close partnership between local government and citizens is needed. We need to promote the equal balance of government, private volunteers in local tree boards and state advisory councils, encourage participation in activities that build skills for working with volunteers, and develop technical assistance programs specifically for corporations and civic organizations. We need to encourage local governments and private industry to promote volunteer activities by providing seed money to develop citizen volunteer groups.



Research and Technology Transfer

Urban forest research provides the foundation for managing urban and community forests (USDA Forest Service 1996). The National Research Agenda for Urban Forestry in the 1990s (ISA 1991) revealed 13 research needs and six information dissemination needs of vital importance to urban forest resources in the 1990s.

Research Needs:

- Ecological benefits of the urban forest
- Economic benefits of the urban forest
- Urban tree genetics
- Investigation of matching planting site to plant type
- Cost-benefits of existing trees versus new plantings
- Impact on energy consumption
- New tree care equipment, techniques, and practices
- Integrated pest management
- Construction and its effect on tree health
- Basic tree biology
- Resource inventory of the urban forestry
- The role of the urban forest in the urban ecosystem
- Community involvement with tree concerns



Information Dissemination Needs:

- Environmental benefits of the urban forest
- Reduction of tree destruction and injury at construction sites
- Social benefits of the urban forest
- Fundamental tree biology
- Matching of tree to environment and site
- Economic benefits of the urban forest

In 1993, ISA published "Consolidating and Communicating Urban Forest Benefits" which summarized the current research findings and future research areas for quantifying urban forest benefits and costs, and developed a computer program called Quanti Tree for quantification of benefits of urban forests using the existing resources. Future research is summarized in following areas:

- Environmental functions: air quality, energy use, carbon storage, water quality and storm water
- Socioeconomic functions: property values, environmental perception, urban wildlife, tree program cost
- Management implication of the environmental and socioeconomic research
- Insect and disease research
- Genetics and tree improvement, and innovative tree care technology.

Stimulated by federal, state, and private funding for urban forestry and environmental studies, research activities in urban forestry have increased significantly in recent years which involve many research entities such as USDA, Environmental Protection Agency, professional organizations (ISA Research Trust, American Forests, etc.), many institutions of higher education, and local groups. The research findings have contributed much more knowledge to our current understanding and management of urban forests. The USDA Forest Service takes a leadership role in providing urban forestry research and information dissemination such as Chicago Climate Project, the Southern Global Change Project, and the NUCFAC's Challenge Cost-Share (CCS) Grants.

The National Strategic Plan (NUCFAC 1993) called for federal, state, and private industries to support significantly expanded research and assure widespread distribution of the findings. As such, there is a current need for conducting a national inventory and assessment of the state of

current research in urban and community forestry to identify areas for new and expanded research (Macie 1996). Research and nonprofit organizations need to communicate and identify issues of research needs.

The Southern Community Forestry Summit (1996) for example has identified research issues in the South. These issues cover urban forest ecology and management, sociology, economics, communication, education, recreation, political science, and arboriculture research. It's clear that the community needs for research information cross many disciplines. Thus, researchers must seek partnerships and collaboration between agencies of various nature and professionals in various disciplines.

We need continuing and expanding financial supports from current funding agencies to support the research in urban forestry. Most importantly, we need to translate urban forestry research for people outside the profession and use State Forestry Agencies, the USDA Extension Service, State forestry agencies, and other agencies to distribute research findings.

Funding



A strong active effort needs to be made to continue federal funding for urban and community forestry at the national level by all interested partners,. In addition, there is a need to stimulate additional funding from traditional and nontraditional sources, and promote private sector funding for urban forestry. The National Strategic Plan calls for increasing traditional and non-traditional funding of urban forestry by 10% annually over a six year period.

In order to do so, we need to develop private and public partnership projects, provide local groups with a comprehensive model for private funding partnerships, catalog and publish sources of government assistance and private sources (i.e., foundations or utility companies), approach environmental and urban renewal groups about funding urban and community forestry projects, and educate local governmental officials and volunteer groups on the benefits of urban forestry and sources of funding (NUCFAC 1993, 1994). Funding Sources for Community and Economic Development (Oryx Press's GRANTS database) by Miner (1997) is an excellent guide to current sources for local programs and projects, and it's also listed in the World Wide Web on the Internet.



Existing Resources: Partners and Their Goals

Government

FEDERAL AGENCIES

Granted by the Cooperative Forestry Assistance Act of 1978, PL 95-313 as amended and the Forest and Rangeland Renewable Resources Act of 1978, PL 95-307 as amended, the Forest Service has legislative authority to provide financial, technical, and related assistance in urban and community forestry to State Foresters or equivalent state officials; cooperate with local units of government; and to conduct, support, and cooperate in research in rural, suburban, and urban areas. According to the Forest Service's National Urban and Community Forestry Strategic Plan (USDA Forest Service 1996), the current and future role of the Forest Service in urban and community forestry is to provide national leadership and long-term continuity of Federal efforts to:

- Support the development of cultural values that recognize the importance of natural resources in populated areas.
- Increase the capacity of state forestry agencies, local governments, and the private sector to create and implement local programs that will sustain and improve urban and community natural resources.
- Encourage citizens to become actively involved in the management and protection of their urban and community natural resources.
- Analyze, develop, demonstrate and disseminate scientific information about protecting, managing, and utilizing renewable forest resources.

The Federal program emphasizes vital communities through healthy ecosystems, which will guide the development of the Forest Service's urban and community forestry effort. The program implementation strategies are through four areas:

- Leadership and public policy
- Education and communication
- Partnerships and the social dimension
- Science and research

Within the federal government, partnership between the Forest Service, the Natural Resources Conservation Service, the National Park Service, the U.S. Fish and Wildlife Service, the Cooperative State Research, Education and Extension Service, the Environmental Protection Agency and the Department of Housing and Urban Development is a necessity. Cooperation and partnership between Federal, state and private sectors will be the key to ensure the successful execution of the urban and community forestry initiative—vital communities through healthy ecosystems. To do so, the Federal government needs to continuously support and significantly increase the current funding levels in urban forestry program for implementing its program strategies through cooperation with state forestry agencies.

STATE AGENCIES

Each state has its own set of agencies responsible for forestry-related issues. Some of these include the state's forestry agency, environmental management agency and the university system. Responsibilities are usually defined through state legislation or statutes. Currently, every state has an urban forestry coordinator (Appendix 2). State urban and community forestry coordinators act as catalysts in cooperating with the federal government and initiating local action.

Today's state forestry agencies realize that one of the best ways to enhance and sustain the benefits derived from this resource is to assist communities in developing municipal programs that meet local needs. State programs convey how the benefits of a safe, healthy and functional urban forest resource can address community needs, as well as demonstrate how to consistently obtain these benefits through municipal programs.

The current trend for most states is to view their roles as helping local governments and citizen groups develop and implement an organization that has both the authority and the ability to effectively manage the resource. This is referred to as a comprehensive urban forest management program. Effective programs typically involve four areas:

- **Administrative Commitment**—Administrative support for the program equal to other community infrastructure services.
- **Advisory Committee**—A citizen based commission advising local government officials on policies and projects, recommending new directions and opportunities, and advocating the program's mission.
- **Legislation**—A community ordinance provides the program's legal authority. It should define the program in terms of its direction, authority, limitations, arboricultural specifications, and how it will interact with other community agencies.
- **Funding**—A stable and adequate funding source from the general revenue. External moneys, such as grants, can be used for specific projects, but should never be relied upon for long term program support.

It has become clear that urban forestry is a local function best carried out through a municipal tree care program or by citizens. Using this model, the federal government's role is to promote the national awareness of urban forestry as well as facilitate effective state urban forestry programs. State programs in turn provide guidance and technical assistance to local governments and citizens who actually implement urban forestry projects.

With the push for a balanced budget and the corresponding downsizing of the federal government, state agencies will have to assume a larger urban forestry role if the current momentum is to be maintained. A reduction in federal cost-share grants for local urban forestry will cause state agencies to look inward for the resources necessary to service their community customers. To accomplish this, urban forestry partners and state decision-makers must find consensus on the level of state assistance and financing necessary to ensure that communities have the opportunity to meet their objectives.

This process is based on the understanding and appreciation that the urban forestry is accomplished only at the local level. It is only effective by citizen participation in partnerships with local government, e.g. Savannah model. And, it is sustainable only when it addresses local

needs. State government's role is to facilitate local programs in their effort, while the federal government continues to provide leadership at the national level. As urbanization increases and government bureaucracy decreases, this relationship must become more productive if America is going to realize its potential of an enhanced quality of urban life.

LOCAL GOVERNMENTS

Implementing a community forestry program is the responsibility of the local government, whether it is a city, town, village, county, park district or other entity.

An effective tree care program should include many elements. The most important are best summarized by the National Arbor Day Foundation's requirements for Tree City USA. Tree City USA is a national recognition program for communities with effective tree care programs.

A forestry program needs responsible people to plan and implement actions. Today, the nation's 2,136 Tree City USA communities demonstrate a growing commitment to improve the quality of life through the proper management of its resource. In addition, 381 Tree City USA communities were recognized with the Growth Award for significant environmental improvement, and achievement. Many cities have forestry departments or have hired a city forester or arborist; however smaller towns will often appoint a board to plan for and carry out the program. A set of rules and regulations regarding trees on public and private property must also be enacted. This usually takes the form of an ordinance. State enabling legislation is often needed to ensure the legality of the ordinance.

A budget to carry out program activities and enforce the provisions of the ordinance is also a necessity. The budget (a minimum of \$2 per capita) must be large enough to carry out tree planting, maintenance, and removal programs. In addition, the community should make a periodic inventory of future trees' needs. Inventory provides a basis for management planning.

The final requirement for Tree City USA status is the issuance of an Arbor Day proclamation by the community leaders. Successful programs are based on public awareness and support. Neighborhood and media involvement in Arbor Day activities and the tree program are essential for success. State recognition and media coverage of community Arbor Day activities can help bring about public awareness and support.

Academic/Research Institutions and Professional Organizations

Fifty institutions in the United States provide teaching, research and outreach opportunities in urban and community forestry. The universities or institutions are listed in a computer database (ISA 1995). Their role is to produce highly educated urban forestry professionals, conduct sound research to solve urban forestry issues, and promote public awareness of urban forestry. Partnership between these institution, federal, state, private industries, and professional

organizations is often promoted through grants support and collaboration. However, among these institutions, only a few of schools offer a degree in Urban Forestry. The rest of the institutions offer either a course or degrees in urban forestry related fields. Considering urban forestry as a relatively young field and current high demand for urban foresters, more universities should consider offering a degree in urban forestry, or urban forestry as an option under a traditional forestry degree program.

Organizations, such as the International Society of Arboriculture, American Forests, Society of American Foresters, American Association of Nurserymen, the National Arbor Day Foundation and National Arborist Association, continue to be major influences in promoting community forestry activities. For example, ISA Research Trust is very involved in funding research (more than \$150,000 per year) and developing educational programs for professionals involved in arboriculture. ISA is an affiliation of nearly 10,000 professionals involved in commercial, municipal, and utility arboriculture as well as researchers and educators. Programs offered include Plant Health Care program, Arborist Certification program, Research Trust Grants, and many educational publications. American Forests develop Urban Ecological Analysis service, CITYgreen software, Global ReLeaf, Cool Community program, and conduct national urban forestry conference. These programs have significantly enhanced many teaching, research and management communities in urban and community forestry.

Citizen-Based, Nonprofit Organizations and Tree Care Industries

Private citizens stimulate action at the local level by becoming involved in public tree planting programs, information programs, education, demonstration projects, lobbying efforts in legislatures, and conferences and workshops. National nonprofit volunteer organizations, such as the National Tree Trust (NTT) and the Alliance for Community Trees (ACT), have provided invaluable support for urban and community forestry.

NTT was established in 1991 and endowed with a grant from the U.S. Congress under the "America the Beautiful" initiative designated by the President. The mission of NTT is to act as a catalyst for local volunteer groups in the growing, planting and maintaining trees in rural communities, urban areas and along highways.

ACT was founded Earth Day 1993 as the national support network to serve citizen-based, grassroots urban and community forestry organizations.

Volunteer groups must work together to establish effective relationships with federal, state, and local governments in promoting tree planting and public action. For example, the Forest Service reported that in 1995, a total of \$2.9 million was awarded to more than 600 volunteer organizations and involved 395,000 volunteers in community-based projects.

The private sector can meet the urban forestry needs of many communities across the nation. The tree care industry is a multi-billion dollar industry. It is represented by many organizations

from a wide variety of disciplines including arboriculture, civil engineering, consulting, forestry, home building, horticulture, landscape architecture, landscape contracting, planning, real estate appraisal, and others. The people in this industry are dedicated to improving the quality of life in communities and many are ready to enter into partnerships with local, state, and federal agencies to achieve that goal.

Program Recommendations

This assessment makes the following recommendations to federal, state, and local governments, and the private sector to enhance urban and community forest resources and strengthen urban and community forestry programs across the nation.

1. Foster strong partnerships between federal, state, local, and private sectors in implementing NUCFAC's National Strategic Plan.
2. Establish national, regional, and local initiatives and incentives that assist communities in the implementation of an ecosystem-based management of urban and community forest resources. Use modern technology (i.e., Geographic Information System and Global Position System) to enhance our vision of future urban and community forests.
3. Develop long-term cost-effective management plans for urban and community forests at state and local levels; toward maximizing ecological, economic, and social benefits of urban and community forest resources.
4. Increase the budget for management, education, and research in urban and community forestry at federal, state, and local governments' levels.
5. Develop and promote national, regional, and local education programs in urban and community forestry to increase public awareness and participation.
6. Encourage and support academic institutions for higher education and professional organizations to offer urban forestry degrees and related programs and to provide and train urban forestry professionals to meet the national demand for managing urban forest resources.
7. Continue to support and expand urban forestry research and demonstration projects. Increase funding for urban and community forestry research and technology transfer as prioritized in the National Research Agenda for 1990s.

8. Support and encourage citizen-based volunteer organizations nationwide and recognize their roles in successful implementation of urban and community forestry programs and management for vital and healthy urban ecosystems.
9. Develop strategies to promote all communities to recycle, reduce, and reuse urban waste wood.
10. Develop disaster preparedness and mitigation strategies at the community level to reduce the cost associated with natural disasters.

Forestry: A Community Tradition

Trees are so much a part of our lives that few people would dispute their value. There are more than 69 million acres of urban forests that are associated with the nation's 45,000 communities, and in which reside nearly 80 percent of the nation's population. These forests are vital to millions of Americans. Currently, more than 8,200 communities participate in urban forestry programs and nearly 400,000 volunteers have been involved in various Forest Service-sponsored urban forestry programs nationwide. The urban and community forestry movement has matured over the last 15 years from managing street trees to understanding the benefits of trees in urban ecosystems. This report highlights the accomplishments of the urban and community forestry movement; examines the trends in urban and community forestry; evaluates the economic, ecological, environmental, and social values of forests and trees to communities; and makes recommendations for federal, state, and local governments, and the private sector to enhance urban and community forests.

Forestry is a community tradition. To keep it a tradition, the recommendations made in this report need to be implemented. Such action could stimulate all communities to develop and enhance forest management programs and help to achieve a vital community through a healthy ecosystem. Only you can keep forestry a community tradition. Keep the tradition alive by letting others know about the benefits and needs of urban and community forests.



References

- Albrecht, J. 1993. Urban Forestry: A Bibliography. Savoy, IL: International Society of Arboriculture.
- American Forests. 1996a. Urban Forestry Movement: Current Trends and A Vision for the Future. A fact sheet presented in the Seventh America Forest Congress, Feb. 20-24, 1996.
- American Forests. 1996b. Urban Ecological Analysis for Dade County, Florida. April 1996.
- Anderson, L.M. and H.K. Cordell. 1988. Influence of trees on residential property values in Athens, Georgia: A survey based on actual sales prices. *Journal of Landscape and Urban Planning* 15:1988:153-164.
- Bernatzky, A. 1978. *Tree Ecology and Preservation*. Elsevier Scientific Publishing Co., Amsterdam.
- Blanche, C.A. and H.F. Carino. 1996. Sawmilling urban waste logs: an income-generating option for arborists. *Arborist News* 5(5): 45-48.
- Burban, L.L. and J.W. Andresen. 1994. *Storms Over the Urban Forest*. U.S. Government Printing. 152 pages.
- California Energy Commission. 1993. 1993 Electricity Report, Air Quality. Sacramento, CA: California Energy Commission.
- Casey, C.J. and R.W. Miller. 1988. State Government in Community Forestry Survey. *Journal of Arboriculture* 14(6):141-144.
- Cesa, E.T. E.A. Lempicki and J. H. Knotts. 1994. Recycling Municipal Trees: a guide for marketing sawlogs from street tree removals in municipalities. USDA Forest Service, Northeastern Area State and Private Forestry, Forest Resources Management, Morgantown, WV. NA-TP-02-94. 52 pages.
- Colbaugh, P.F. 1990. Recycle clippings. *Grounds Maintenance* 25(5):12-13.
- Corbett, E.S. 1980. Employing the urban forest for water quality and quality control. In: National Urban Forestry Conf., 1978, Proc. 1:431-432.
- CTLA, Council of Tree and Landscape Appraisers. 1992. *Guide for Plant Appraisal*, 8th edition. International Society of Arboriculture. London, Construction Press.
- DeWalle, D.R., and G.M. Heisle. 1988. Use of windbreaks for home energy conservation. In: Brandle, J.R. et al., eds. *Windbreak technology: Proceedings of International Symposium on Windbreak Technology*, Lincoln, NE, June, 1986.
- Dwyer, J. 1991. Economic values of urban trees. In: international Society of Arboriculture. A national research agenda for urban forestry in the 1990's. Urbana, IL, International Society of Arboriculture. pp. 24-28.
- Dwyer, J.F., H.W. Schroeder, J.J. Louviere and D.H. Anderson. 1989. Urbanites' willingness to pay for trees and forests in recreation areas. *Journal of Arboriculture* 15(10):247-252.
- Elmendorf, B. 1996. Use ecosystem based management to develop community. Unpublished Manuscript. University Park, PA: School of Forest Resources, Pennsylvania State University.
- Gangloff, D. 1995. The sustainable city. *American forests* 101(5&6):30-34, 38.
- Green, T.L. 1984. Maintaining and preserving wooded parks. *Journal of Arboriculture*. Vol.X. No.7.

- Griffin, J.M. 1972. Landscape Data Manual. Building News, Inc. Los Angeles, CA. 60 pages.
- Henson, S. L. and R. Rowntree. 1985. Influence of urban forest cover on radiation temperature and runoff in the Salt Lake Basin, Utah. Proceedings 1985 SAF National Convention. pp. 412-415.
- Huang, Y.J., H. Akbari, H. Taha and A.H. Rosenfeld. 1987. The potential of vegetation in reducing summer cooling loads in residential buildings. *Journal of Climate and Applied Meteorology* 26(9):1103-1116.
- ISA, International Society of Arboriculture. 1991. A national research agenda for urban forestry in the 1990's. Urbana, IL, International Society of Arboriculture. 60 pages.
- ISA, International Society of Arboriculture. 1993. Consolidating and Communicating Urban Forest Benefits. Prepared by Davey Resource Group. 103 pages.
- ISA, International Society of Arboriculture. 1995. Catalog of Curricula in Arboriculture, Urban Forestry and Related Areas. Developed by M.E.P. Wingate, J.A. Wagar, and C.H. Hamilton, Center for Urban Horticulture, Univ. of Washington.
- Johnson, J. 1975. Frederic Law Olmstead, Partner with Nature. Dodd, Mead, and Company.
- Kennedy, C.B and E.H. Zube. 1991. Attitudes towards vegetation in a desert urban forest: creating a sense of place. 17(6):159-166
- Kielbaso, J.J., B.S. Beauchamp, K.F. Larison, and C.J. Randall. 1988. Trends in urban forestry management. Washington, D.C., International City Management Association, Baseline Data Report 20(1):1-17.
- Kollin, C. 1991. On balance: Weighing the costs and benefits of urban trees. U.S. Forest Service, University of California, City of San Jose.
- Kollin, C. 1994. "Cycling" through the urban ecosystem. *Urban Forests* 14(5):10-15.
- Kollin, C. 1995. Issues related to nature's cycles. *Urban Forests* 15(1):10-11.
- Lull, H. W. and W. E. Sopper. 1969. Hydrologic effects from urbanization of forested watersheds in the Northeast. U.S. Forest Service, Research Paper NE-146:1-30.
- Macie, E. 1996. Urban Forestry research Update. Presented at the SAF Annual Convention, Urban Forestry Working Group, Albuquerque, NM. Nov. 11, 1996.
- Maslow, S. 1977. Control of nonprofit sources, construction activities. Preliminary Draft Edition (Illinois institute of natural resources. Project No. 20.100, August 1977) p.4.
- Massachusetts. 1899. Acts of 1899. Chapter 330. Approved May 4, 1899. "The 1899 Law Mandating Tree Wardens."
- McPherson, E. G. 1988. Functions of buffer plantings in urban environments. *Agriculture, Ecosystems and Environment*. 22/23:281-298.
- McPherson, E.G. 1994a. Energy -saving potential of trees in Chicago. In E. G. Mcpherson, D. J. Nowak, and R. R. Rowntree eds., *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. Gen. Tec. Rep. NE-186. Radnor, Pa.:USDA Forest Service, NEFES.

- McPherson, E.G. 1994b. Benefits and costs of tree planting and care in Chicago. In: E. G. Mcpherson, D. J. Nowak, and R. R. Rowntree eds., *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. Gen. Tec. Rep. NE-186. Radnor, Pa.:USDA Forest Service, NEFES.
- McPherson, E.G. and P. Sacamano. 1993. Modeling the benefits and costs of community tree plantings. In: *Proceedings of the Sixth National Urban Forestry Conference*, Minneapolis, Sept., 1993. Washington, D.C., American Forests.
- McPherson, E.G., and R.A. Rowntree. 1991. The Environmental benefits of urban forests. In: *A National Research Agenda For Urban Forestry in the 1990's*. Prepared by the International Society of Arboriculture.
- McPherson, E.G., and R.A. Rowntree. 1993. Energy conservation potential of urban tree plantings *Journal of Arboriculture* 19(6):321-331.
- Mills, G.S., Dunning, J.B. and Bates, J.M. 1989. Effects of urbanization on breeding bird community structure in southwestern desert habitats. *The Condor*, 91: 416-428.
- Miner, L.E. 1997. *Funding Sources for Community Economic development 1997: A guide to current sources for local programs and projects*. Oryx Press. 509 pages.
- Moll, G. and S. Young. 1992. *Growing Greener Cities*. Living Planet Press, Los Angeles, CA.
- Moll, G. and J. Petit. The urban ecosystem: putting nature back in the picture. *Urban Forest*. October/November 1994:8-15.
- Morales, D.J., F.R. Micha and R.L. Weber. 1983. Two methods of evaluating trees on residential sites. *Journal of Arboriculture* 9(1):21-24.
- Murdock, S. H. 1995. *An America Challenged*. Westview Press, Boulder CO.
- NASF, National Association of State Foresters. 1994. *An Ecological Approach to Urban and Community Forest Management: Position Statement - September 1994*. 8 pages.
- National Tree Trust and USDA Forest Service. 1992. *Urban and Community Forestry Program national Resources Directory*. 80 pages. America The Beautiful National Tree Program.
- Nowak, D. J. 1993. Compensatory value of an urban forest: An application of the tree-value formula. *Journal of Arboriculture* 19(3):139-142.
- Nowak, D. J. 1994a. Air pollution removal by Chicago's urban forest. In E. G. Mcpherson, D. J. Nowak, and R. R. Rowntree eds., *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. Gen. Tec. Rep. NE-186. Radnor, Pa.:USDA Forest Service, NEFES.
- Nowak, D. J. 1994b. Atmospheric Carbon Dioxide Reduction by Chicago's urban forest. In E. G. Mcpherson, D. J. Nowak, and R. R. Rowntree eds., *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. Gen. Tec. Rep. NE-186. Radnor, Pa.:USDA Forest Service, NEFES.
- NUCFAC, National Urban And Community Forestry Advisory Council. 1993. *The Forest Where We Live: A National Strategic Plan*. USDA Forest Service FS-543.
- NUCFAC, National Urban And Community Forestry Advisory Council. 1994. *The Forest Where We Live: An Action Plan*. March, 1994.
- NUCFAC, National Urban And Community Forestry Advisory Council. 1994. *Annual Report*.

- Orberts, G.L. 1977. Water quality effects of potential urban best management practices: a literature review. Technical Bulletin No.97. Dept. of Natural Resources. Madison, WI.
- Payne, B.R. 1973. The twenty nine tree home improvement plan. *Natural History* 82(9):74-75.
- Pequigot, S. 1996. Future of urban and community forestry initiatives relative to NASF. The SAF Urban Forestry Working Group Newsletter (B-2). February 1996.
- Qi, Y., X. Zhou and J. Yan. 1991. Energy-absorption and energy -excahnge in a natural oak forest. In: Long Term Located Research of Forest Ecosystem Volume I, X. Zhou ed. The Northeast Forestry University Press. Harbin, PRC.
- Ripley, T. H. and B. W. Ellertsen. 1971. The role of trees in water relations, in: Symposium on the Role of Trees in the South's Urban Environment, University of Georgia, 1971. Proceedings. pp. 34-38.
- Rowntree, R.A. and D.J. Nowak. 1991. Quantifying the role of urban forests in removing atmospheric carbon dioxide. *Journal of Arboriculture* 17(10):269-275.
- Schoeneman, R. S. 1996. 1995 Urban and Community Forestry Program Accomplishments. SAF Urban Forestry Working Group Newsletter (B-2) May 1996.
- Schoeneman, R. S. and Z. Doyle. 1992. Trees in the Community; Managing the Urban Forest. Management Information Service. ICMA Vol.24/No.5.
- Schroeder, Herbert W. and Thomas L. Green, 1985. Public preference for tree density in municipal parks. *Journal of Arboriculture* 11(9):272-277.
- Semrau, A. 1993. Helping trees weather nature. *Urban Forests*. Vol. 13.No.1:12-17.
- Seventh American Forest Congress. 1996a. Final Report. April 2, 1996. W. R. Bentley, Executive Director and W. D. Langbein, Editor. Office of the Seventh American Forest Congress, 205 prospect St., New Haven, CT 06511.
- Seventh American Forest Congress. 1996b. Concurrent Dialogue Sessions and References. Feb. 20-24, 1996. Sheraton Washington, Washington. D.C. Office of the Seventh American Forest Congress, 205 prospect St., New Haven, CT 06511.
- Shaw, W. W., W.R. Mangum and J.R. Lyons. 1985. Residential enjoyment of wildlife resources by Americans. *Leisure Sciences*. 7(3):361-375.
- Southern Community Forestry Summit. 1996. Research Issues in the South. September 18, 1996; Mobile, AL. Southern Region Urban Forestry Technical Service Center. Athens, GA.
- Tschantz, Barbara A and Paul L. Sacamano. 1994. Municipal Tree Management in the United States, a 1994 report. Davey Resource Group. Davey Tree Expert Company, and Communication Research Associates, Inc.
- Tylka, D. 1987. Critters in the city, a pioneering concept. *American Forests*, September/October 1987.
- Ulrich, R.S. 1984. View through a window may influence recovery from surgery. *Science*, 224:420-421.
- Ulrich, R.S. 1986. Human responses to vegetation and landscapes. *Landscape and Urban Planning* 13:29-44.
- Ulrich, R.S., R.F. Simmons, B.D. Losito, E. Fiorito, M.A. Miles and M. Zelson. 1991. Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology* 11:201-230.

USDA Forest Service. 1991. Expanding Recycling Horizons. USDA Forest Service AIB-628. 8 pages.

USDA Forest Service. 1991. People and Tree Growing Together - America the Beautiful National Tree Program. FS-496.

USDA Forest Service. 1993. An Ecosystem Approach to Urban and Community Forestry: A Resource Guide. Radnor, PA: USDA State and Private Forestry, Northeastern Region.

USDA Forest Service. 1994. An Ecosystem-Based Approach to Urban and Community Forestry: An Ecosystem Managers Workbook. Radnor, PA: USDA State and Private Forestry, Northeastern Region.

USDA Forest Service. 1996. Urban and Community Forestry on Course into the Future: Vital Community through Health Ecosystem - A Strategic Direction.

USDA Forest Service. 1998. Report of the Forest Service. Fiscal Year 1997.

Vining, J., T.C. Daniel and H.W. Schroeder. 1984. Predicting scenic values in forested residential landscapes. *Journal of Leisure Research* 16:124-135.

Walk, M.F., D.R. DeWalle, and G.M. Heisler. 1985. Can windbreaks reduce energy use in a mobile home park? *Journal of Arboriculture*. 11(6): 190-195.

Whittier, J., D. Rue, and S. Haase. 1995. Urban tree residues: results from the first national inventory. *Journal of Arboriculture* 21(2): 57-62.

Willeke, D.C. 1986. The urban forest: The imperative forest. In: *Proceedings of the Third Urban Forestry Conference*. American Forestry Association.

Young, S. 1992. Recycling the urban forest. *Urban Forests* 12(4):8-12.



Seventh American Forest Congress Results Relative to Urban and Community Forestry

Note: The three percentages in each parenthesis indicate levels of affirmation in order of agree, mixed feelings but willing to accept, and disagree. The following are the selected vision elements and principles relative to the Urban and Community Forestry. For details please refer to Seventh American Forest Congress final report (1996).

Vision Elements: In the future our forest ...

- Will be held in a variety of public, private, tribal, land grant and trust ownership by owners whose rights, objectives and expectations are respected and who understand and accept their responsibilities as stewards (90%, 7%, 3%).
- Will be enhanced by policies that encourage both public and private investment in long-term sustainable forest management (89%, 6%, 5%).
- Will sustainably provide a range of goods, services, experiences and values that contribute community well-being, economic opportunity, social and personal satisfaction, spiritual and cultural fulfillment, and recreational enjoyment (88%, 8%, 4%).
- Will be maintained and enhanced across the landscape, expanding through reforestation and reforestation where ecologically and culturally appropriate, in order to meet the needs of an expanding human population (85%, 10%, 5%).
- Will be shaped by natural forces and human actions that reflect the wisdom and values of an informed and engaged public, community and social concerns, sound scientific principles, local and indigenous knowledge and then need to maintain options (84%, 11%, 5%).
- Will be managed consistent with strategies and policies that foster integrity and maintain a broad range of ecological and social values and benefits (9%, 14%, 7%).
- Will contribute to strong and vital rural and urban communities that benefit from, project and enhance the forests in their vicinity (74%, 16%, 10%).
- Will be acknowledged as vital by citizens who are knowledgeable and involved in stewardship and who appreciate the contribution of forests to the economic and environmental quality of life (67%, 21%, 12%).
- Will provide a sustainable level of products and benefits that satisfy society's needs because contributions from more efficient utilization, recycling and other efforts reduce consumption. (34%, 31%, 35%)

Principles: People Actions Should Ensure...

- Voluntary cooperation and coordination among individuals, landowners, communities, organizations and governments are encouraged to achieve shared ecosystem goals. (85%, 9%, 6%)
- Comprehensive, integrated and well organized research is well funded. It is designed and conducted in collaboration with stakeholders to ensure for society the countless benefits of our forest ecosystems. Knowledge and technology products are effectively distributed, tested and implemented. (76%, 12%, 11%)
- Urban and community forest ecosystems will be valued, enhanced, expanded and perpetuated. (74%, 15%, 11%)
- Management of forests should sustain ecosystem structure, functions and processes at the appropriate temporal and spatial levels. (70%, 20%, 10%)
- Forestry policy and management decisions must reflect the interdependence of diverse urban, suburban, and rural communities. (69%, 17%, 14%)
- Forests provide a broad range of social, environmental, cultural and economic resources and benefits. (67%, 20%, 13%)
- Forests are a global resources that sustain the health of the planet and its inhabitants. Our forest stewardship must recognize the trends of global population, consequential supply and demand. (67%, 21%, 12%)
- People's actions should ensure factual information and education concerning forests be readily available, engaging and actively disseminated to all. (61%, 20%, 19%)
- Forestry decisions should take into account the concerns of an increasingly diverse U.S. population, as well as the needs of the forests, while linking benefits and responsibilities within the communities. (50%, 26%, 24%)
- The forest related options that are available today shall be maintained for future generations. (45%, 26%, 29%)
- Interdependence of people and forests are recognized and respected, including the importance contribution forests make to social, economic, and community well-being, and the responsibility of communities to support balanced stewardship of all forest values. (44%, 25%, 31%)

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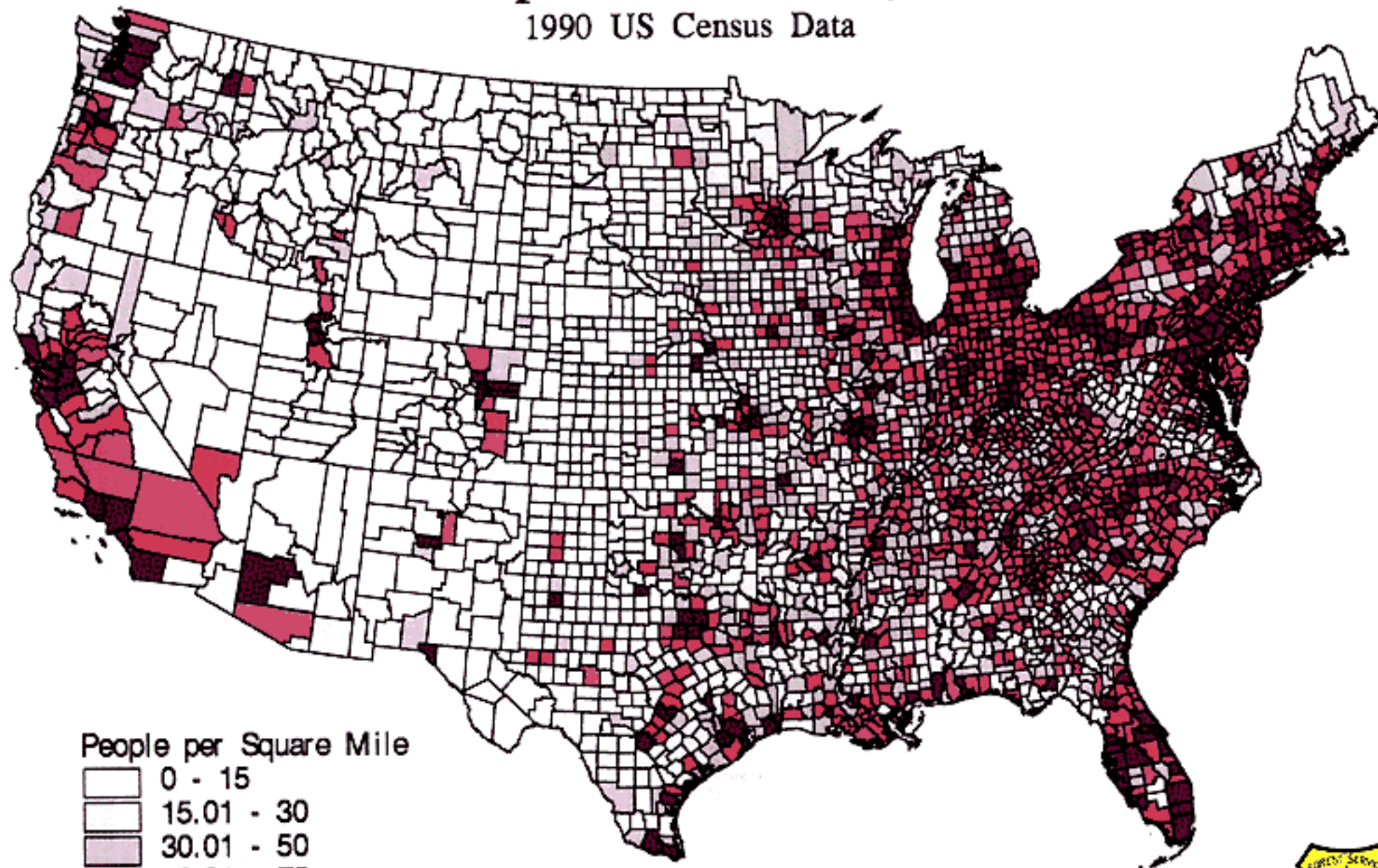
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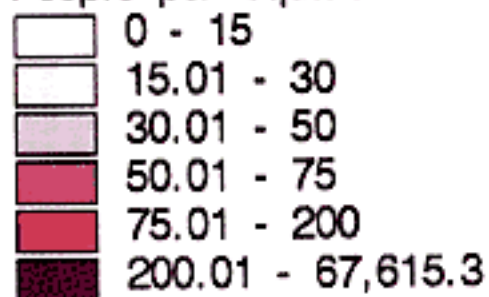
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Population Density

1990 US Census Data



People per Square Mile



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